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Adaptation of H.320 visual telephone terminals to B-ISDN environments

ITU-T Recommendation H.321

Superseded by a more recent version

(Previously «CCITT Recommendation»)

FOREWORD

The ITU-T (Telecommunication Standardization Sector) is a permanent organ of the International Telecommunication Union (ITU). The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, March 1-12, 1993).

ITU-T Recommendation H.321 was prepared by ITU-T Study Group 15 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the19th of March 1996.

NOTE

In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

CONTENTS

SUMMARY

This Recommendation describes technical specifications for adapting narrow-band visual telephone terminals, as defined in Recommendation H.320, to broadband ISDN environments. The terminal conforming to this Recommendation interworks with the same type of terminals (i.e. other H.321 terminals) accommodated in B-ISDN as well as H.320 terminals accommodated in N-ISDN.

ADAPTATION OF H.320 VISUAL TELEPHONE TERMINALS TO B-ISDN ENVIRONMENTS

(Geneva, 1996)

1 Scope

This Recommendation describes technical specifications for adapting narrow-band visual telephone terminals, as defined in Recommendation H.320, to broadband ISDN environments. The terminal conforming to this Recommendation interworks with the same type of terminals (i.e. other H.321 terminals) accommodated in B-ISDN as well as existing H.320 terminals accommodated in N-ISDN.

It is noted that some of the functionalities supported by H.321 terminals are also supported by broadband audiovisual terminals defined in Recommendation H.310. The interworking among H.310, H.321 and H.320 terminals is a mandatory requirement. Interworking between H.320 and H.321 terminals is achieved since the different H.321 terminal types, defined in this Recommendation, include the same functions supported by the corresponding H.320 terminal types. (See 4.4 for more details.) Interworking between H.320/H.321 and H.310 terminals is achieved through a common set of H.320/H.321 functions (defined in Recommendation H.310). For example, in addition to supporting the H.262 video (MPEG-2 video), H.310 terminals shall support Recommendation H.261 which is part of both Recommendations H.320 and H.321.

In H.321 terminals, the adaptation of H.320 functions over B-ISDN is achieved through ATM Adaptation Layer 1 (AAL 1). Both Segmentation And Reassembly (SAR) and Convergence Sublayer (CS) functions, as defined in Recommendation 1.363, are considered in this Recommendation.

H.321 terminals have the same in-band functionalities as those supported by H.320 terminals, i.e. as defined in Recommendations H.242, H.230 and H.221. Extra broadband-related signalling functions, such as negotiation for the use of the Adaptive Clock Recovery method (asynchronous mode), can be accomplished through Q.2931 Information Elements as shown in 5.7.

2 References

The following Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation H.221 (1995), *Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices*.
- ITU-T Recommendation H.230 (1995), *Frame-synchronous control and indication signals for audiovisual systems*.
- ITU-T Recommendation H.242 (1996), *System for establishing communication between audiovisual terminals using digital channels up to 2 Mbit/s*.
- ITU-T Recommendation H.243 (1996), *Procedures for establishing communication between three or more audiovisual terminals using digital channels up to 1920 kbit/s*.
- ITU-T Recommendation H.261 (1993), *Video codec for audiovisual services at p × 64 kbit/s*.
- ITU-T Recommendation H.320 (1996), *Narrow-band visual telephone systems and terminal equipment*.
- ITU-T Recommendation H.310 (1996), *Broadband audiovisual communication systems and terminals*.

- ITU-T Recommendation H.322 (1996), *Visual telephone systems and terminal equipment for local area networks which provide a guaranteed quality of service*.
- ITU-T Recommendation I.361 (1995), *B-ISDN ATM layer specification*.
- ITU-T Recommendation I.363 (1993), *B-ISDN ATM Adaptation Layer (AAL) specification*.
- ITU-T Recommendation I.413 (1993), *B-ISDN user-network interface*.
- ITU-T Recommendation I.580 (1995), *General arrangements for interworking between B-ISDN and 64 kbit/s based ISDN*.
- ITU-T Recommendation Q.2931 (1995), *Broadband Integrated Services Digital Network (B-ISDN) – Digital Subscriber Signalling System No. 2 (DSS 2) – User-Network Interface (UNI) layer 3 specification for basic call/connection control*.
- ITU-T Recommendation Q.939 (1993), *Digital Subscriber Signalling System No. 1 (DSS 1) – Typical DSS 1 service indicator codings for ISDN Telecommunications Services*.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this Recommendation, the following definitions apply.

3.1.1 broadband: Bit rate including and beyond that of narrow-band.

3.1.2 circuit emulation: Emulation of the N-ISDN circuit-switched service by B-ISDN. This is accomplished by the use of the AAL Type 1 service.

3.1.3 in-band signalling: Signalling via BAS of the H.221 frame structure.

3.1.4 narrow-band: Bit rate ranging from 64 kbit/s to 1920 kbit/s. This channel capacity is provided as a single B/H0/H11/H12-channel or a multiple of B/H0-channels.

3.1.5 outband signalling: Signalling via a subchannel not part of the B/H0/H11-channel in N-ISDN or equivalent channel in B-ISDN.

3.2 Abbreviations

For the purposes of this Recommendation, the following abbreviations are used.

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
B-NT	Broadband Network Termination
B-TA	Broadband Terminal Adaptor
B-TE	Broadband Terminal Equipment
BCH	Bose-Chaudhuri-Hocquenghem
C&I	Control & Indication
CBR	Constant Bit Rate
CRC	Cyclic Redundancy Check
CS	Convergence Sublayer
CSI	CS Indication
FEC	Forward Error Correction
IE	Information Element
ISDN	Integrated Services Digital Network

LSD	Low Speed Data
MCU	Multipoint Control Unit
OAM	Operation And Maintenance
PDU	Protocol Data Unit
PHY	PHYsical layer
SAP	Service Access Point
SAR	Segmentation And Reassembly
SDT	Structure Data Transfer
SDU	Service Data Unit
SN	Sequence Number
SNP	SN Protection
SRTS	Synchronous Residual Time Stamp
TE	Terminal Equipment
VC	Virtual Channel

4 System description

4.1 Applications

This terminal can be used for various applications such as conversational services, distributive services, retrieval services, messaging services as the existing H.320 terminal can. This Recommendation does not specify any particular service.

4.2 System configuration

The H.321 terminal is mapped onto the B-ISDN reference configuration, which is described in Recommendation I.413, as shown in Figure 1.

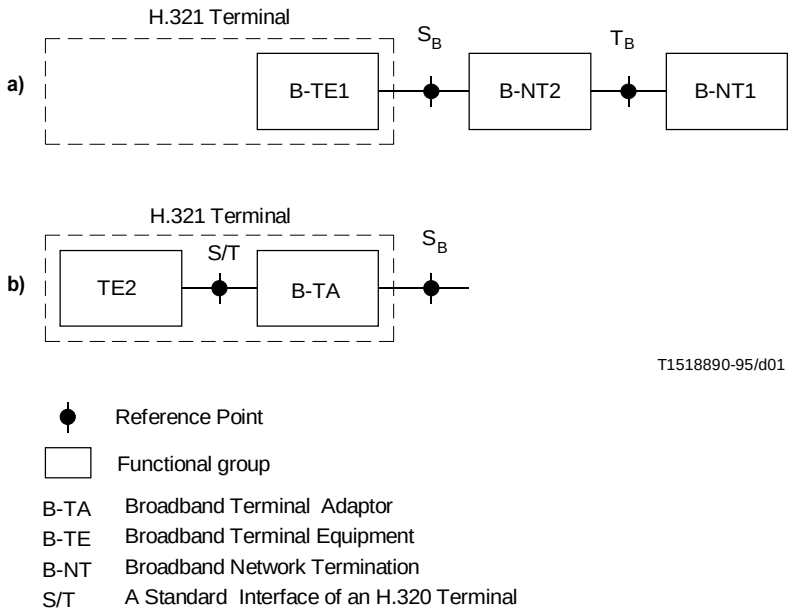

FIGURE 1/H.321

Reference configuration

There are two possible implementations of an H.321 terminal. The first one is of an integrated design which includes H.320, ATM Adaptation Layer (AAL), and ATM functions in a single terminal unit (i.e. B-TE1 in Figure 1).

The second implementation consists of an H.320 terminal equipment (TE2) and a Broadband Terminal Adaptor (B-TA). In this case, an H.320 signal (i.e. with an H.221 framing format) is transmitted at the interface between the H.320 terminal equipment (TE2) and the terminal adaptor (B-TA). Moreover, terminal-to-network signalling is performed in B-TA with possible interaction with TE2.

4.3 Generic terminal architecture

A generic architecture of an H.321 terminal (corresponding to the configuration of Figure 1 a) is shown in Figure 2, where constituent elements and corresponding Recommendations are indicated. The figure includes the following functional units: a video I/O equipment, an audio I/O equipment, a telematic equipment, a system control unit, video and audio codecs, an audio delay unit and a mux/demux unit. These functional units are defined in 3.1/H.320.

The AAL, ATM, and physical units provide the adaptation and interface functions required for accommodating an H.321 terminal over a broadband network.

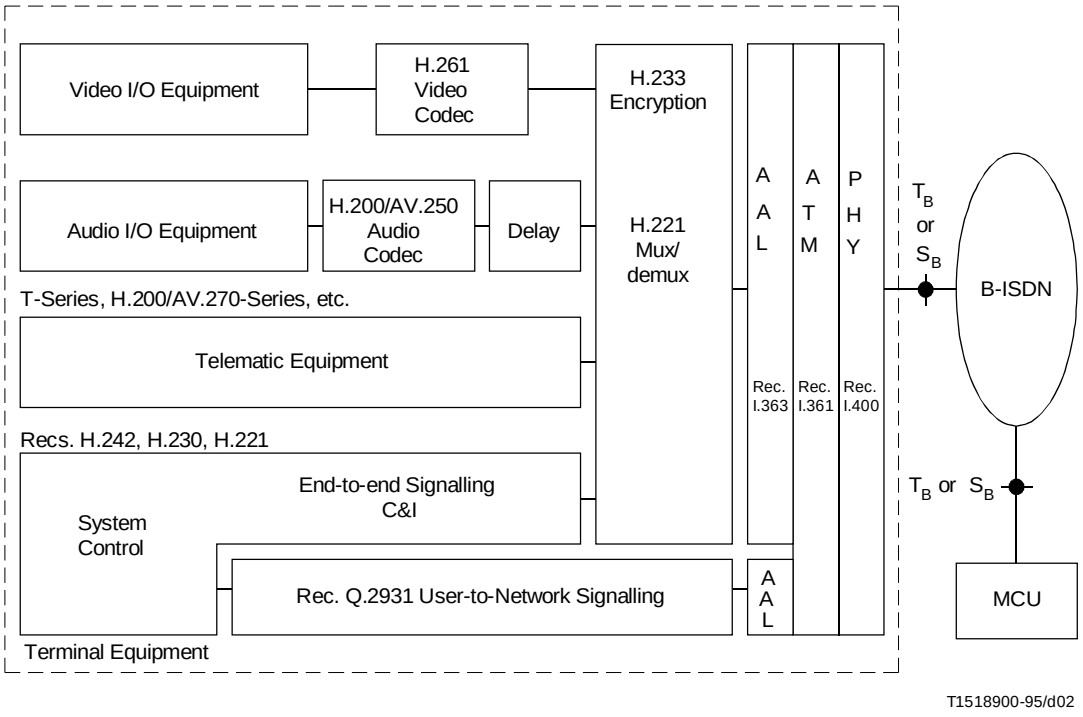

FIGURE 2/H.321

Protocol stack of the H.321 terminal

4.4 Terminal type

Several H.321 terminal types are defined according to the channel access capability (e.g. B, H0 and H11/H12), bit rate classes and audio coding schemes. Each H.321 terminal type has a corresponding terminal defined in Recommendation H.320. Table 1 outlines the different communication and audio coding modes supported by this Recommendation. (This table corresponds to Table 1/H.320.)

Special attention should be paid to the ATM virtual channel capabilities and AAL functions supported by the different H.321 terminals. (ATM and AAL related characteristics are highlighted in Table 1.)

TABLE 1/H.321

Communication modes of H.321 terminals

Visual telephone mode		Channel rate (kbit/s)	N-ISDN channel (Note 1)	Number of ATM Virtual Channels (VC) (Note 2)	AAL functions	Coding	
						Audio (Rec.)	Video
a^y	a^y_0	64	B	1	AAL Type 1 with both SAR and CS functions (see 5.6)	G.711 (Note 3)	Not applicable
	a^y_1					G.728	Rec. H.261
b^y	b^y_1	128	2B	2		G.711	
	b^y_2					G.722	
	b^y_3 (Note 4)					G.728	
g^y (Note 5)	g^y_1	$n \times 64$	nB	n		G.711	
	g^y_2					G.722	
	g^y_3					G.728	
g^y		384	H_0	1		G.722 (Note 6)	
h^y		768	$2H_0$	2			
i^y		1152	$3H_0$	3			
j^y		1536	$4H_0$	4			
k^y		1536	H_{11}	1			
l^y		1920	$5H_0$	5			
m^y		1920	H_{12}	1			

NOTES

1 For multiple B/H_0 connections, all channels are synchronized at the receiving terminal using the multiframe structure mechanism as described in 2.7/H.221.

2 This column represents the minimum number of ATM virtual channels that the corresponding H.321 terminal type shall support. This will enable complete interworking with H.320 terminals through a N-ISDN/B-ISDN interworking unit (according to Recommendation I.580). However, when two H.321 terminals communicate with each other, a single VC can be used for the transfer of the aggregate channel rate (e.g. 128 kbit/s) as explained below.

3 If a visual telephone interworks with a wideband speech terminal, G.722 audio may be used instead of G.711 audio.

4 (Audio coding of mode b_3.) In addition to Recommendation G.728, higher quality audio coding such as H.200/AV.253 may be used for this mode.

5 g = c/d/e/f corresponds to n = 3/4/5/6, respectively. This mode is applicable to the ISDN basic rate interface if multiple basic accesses are used.

6 Other audio modes (Recommendations G.711 and G.728) can be invoked using the appropriate H.242 procedures.

The number of ATM VCs that must be supported by a given H.321 terminal is the same as the number of N-ISDN channels (i.e. B- or H_0-channels) supported by that terminal type (or the corresponding H.320 terminal). For example, under the b^y transfer mode, two separate channels can be established between two H.321 terminals. Synchronization between the two channels is achieved through the multiframe structure described in Recommendation H.221. Similarly, an H.320 terminal using the b transfer mode (i.e. two B-channels over a N-ISDN network) can communicate with an H.321 terminal that is capable of supporting the b^y mode (i.e. two B-channels each of which is carried by an ATM VC over a B-ISDN network through circuit emulation). Figure 4 a) illustrates the transfer mode of multiple channels over multiple VCs. *The support of this mode by H.321 terminals, which support multiple B- or H_0-channels (i.e.* b^y, $g^y_{1\text{-}3}$, h^y, i^y, j^y *and* l^y*), is mandatory*.

Moreover, when two H.321 terminals communicate with each other, a single VC can be used for the transfer of the aggregate channel rate (e.g. 128 kbit/s). The use of a single VC will require the exchange of some user-to-user signalling information between the two terminals during call setup. The use of Q.2931 messages to identify terminals as being H.321 rather than H.320 is under study (jointly with Study group 11).

For the single VC case, there are two possibilities for the transfer of the audiovisual data:

1) The data contains multiple H.221 service channels, the number being the same as the number of B- or H_0-channels. This mode is illustrated in Figure 4 b). *The support of this mode by H.321 terminals, which support multiple B- or H_0-channels (i.e.* b^y, $g^y_{1\text{-}3}$, h^y, i^y, j^y *and* l^y*), is optional*. The specification on this case is under study.

2) The data contains a single H.221 service channel (i.e. FAS/BAS). This mode is illustrated in Figure 4 c). *The support of this mode by H.321 terminals, which support a single B-, H_0-, H_{11}-, or H_{12}-channel (i.e.* a^y, g^y, k^y *and* m^y*), is mandatory*. However, *the support of this mode by H.321 terminals, which support multiple B- or H_0-channels (i.e.* b^y, $g^y_{1\text{-}3}$, h^y, i^y, j^y *and* l^y*), is optional*.

See 5.6 for more details regarding the multiple and single VC transfer modes.

4.5 Point-to-point communication

An H.321 terminal may have a variety of capabilities. In point-to-point communications, a common set of them is determined on a call-by-call basis through the communication procedures defined in Recommendation H.242.

4.6 Multipoint communication

An H.321 terminal can participate with other H.321 or H.320 terminals in multipoint communications through MCUs which are accommodated in B-ISDN or N-ISDN. An example of a multipoint configuration is shown in Figure 3. The necessary communication procedures are found in Recommendation H.243.

5 Infrastructure

5.1 Audio coding

As per Recommendations G.711, G.722, G.728 or other standardized coding methods which may be added in the future.

5.2 Video coding

As per Recommendation H.261.

5.3 Multimedia multiplexing and synchronization

As per Recommendation H.221.

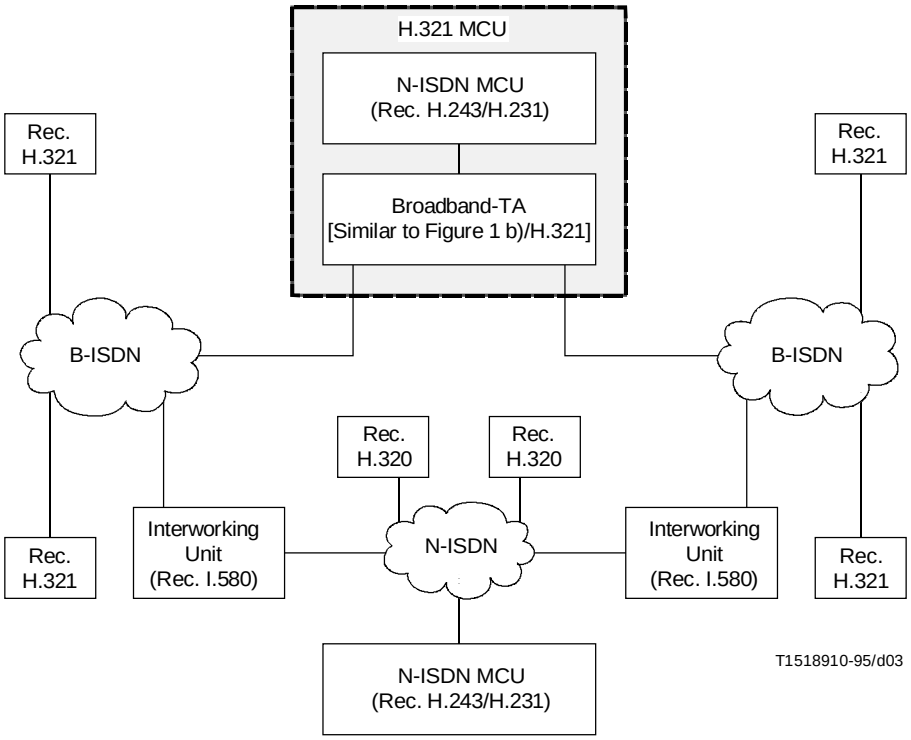

FIGURE 3/H.321

An example of a multipoint configuration for H.321/H320 terminals

5.4 End-to-end control

Mandatory Control & Indication signals are defined in Table 4/H.320. Other C&I signals are defined in Recommendation H.230.

5.5 Communication procedures

As per Recommendations H.242 and H.243.

5.6 AAL functions

Segmentation And Reassembly (SAR) and Convergence Sublayer (CS) functions of AAL Type 1 (AAL 1) shall be supported by H.321 terminals. Figure 4 shows a functional architecture for the SAR and CS functions and their interfaces within an H.321 terminal.

Three transfer modes are shown in the figure: multiple channels over multiple VCs, multiple channels over a single VC and a single channel over a single VC. H.321 terminals that support the transfer of multiple channels must support the mode illustrated in Figure 4 a). H.321 terminals that only support the transfer of a single channel (e.g. single B or H_0) must support the mode illustrated in Figure 4 c). The support of the transfer mode illustrated in Figure 4 b) is optional. (See 4.4 for more details.)

For the multiple channels over a single VC case [i.e. the mode shown in Figure 4 b)], the multiplexing shall be done using octet interleaving among the different channels. An example of this is shown in Figure 5.

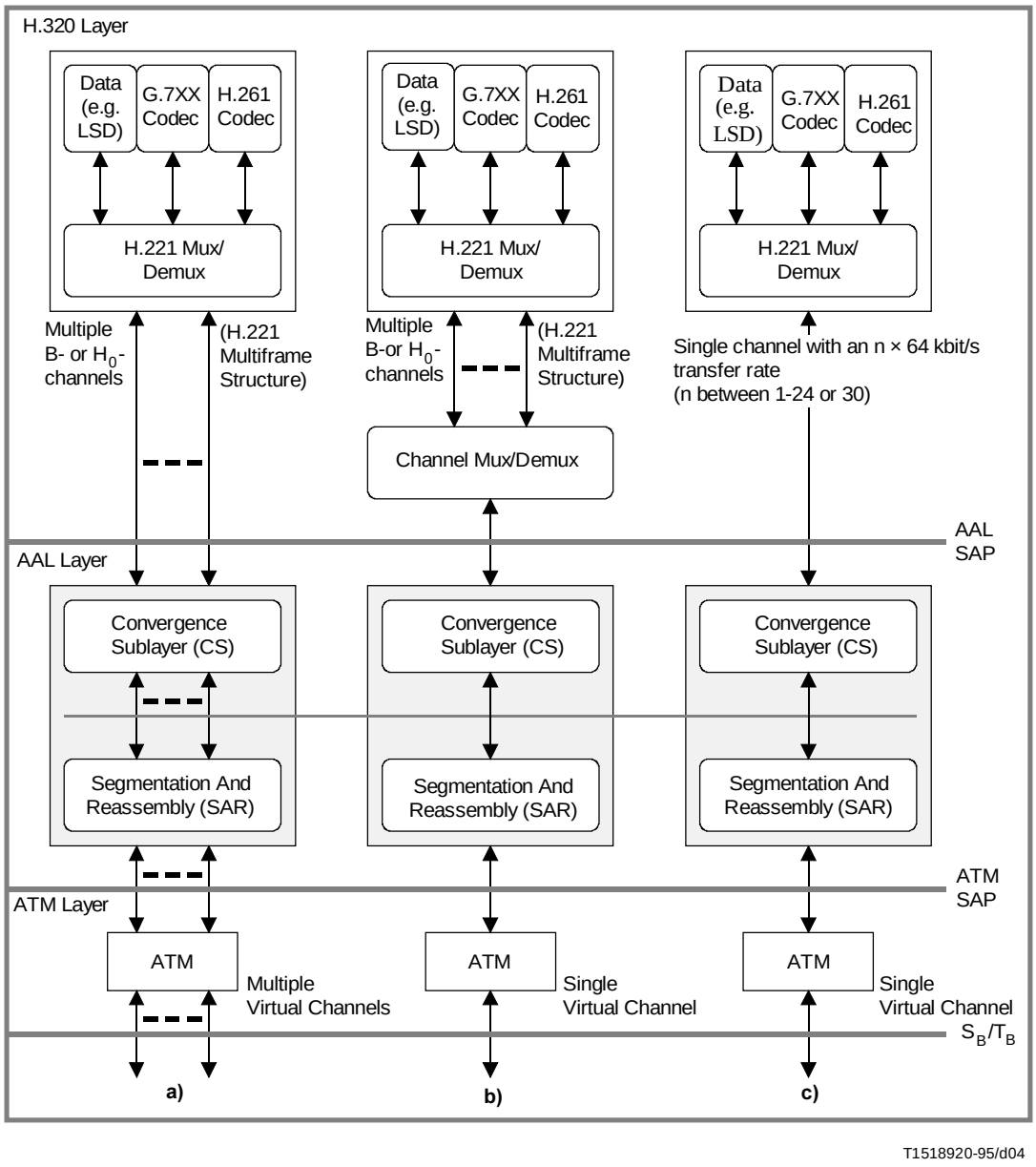

FIGURE 4/H.321

AAL layer interfaces for H.321 terminals with single and multiple virtual channels

At the AAL Service Access Point (AAL-SAP), the CS sublayer receives AAL Service Data Units (AAL-SDUs) from the H.320 layer. The AAL-SDU is an octet of a Constant Bit Rate (CBR) H.320 signal. The SAR sublayer receives a 47-byte CS Protocol Data Unit (PDU) from the convergence sublayer, and adds a one byte of SAR header to generate the 48-byte SAR-PDU. The SAR-PDU is passed to the ATM layer across the ATM-SAP. The ATM layer adds the five-byte ATM header and forms the 53-byte ATM cell.

5.6.1 Convergence sublayer functions

The only CS function supported by H.321 terminals is the Structure Data Transfer (SDT) mode. It is important to note that all H.321 terminals are required to support this function at all times[1)]. The SDT mode includes the transfer of the SDT pointer for all n × 64 transfer rates except for the single B (i.e. 64 kbit/s) case as specified in Recommendation I.363. The SDT mode shall be used both when H.321 terminals are communicating with H.320

1) The use of the SDT pointer for the transfer mode illustrated in Figures 4 b) and 5 (i.e. multiple channels over a single VC) is under study.

terminals, and when H.321 terminals are communicating among themselves over a B-ISDN network. It is also important to note that when multiple B-channels are established over multiple VCs, then the SDT pointer is not used in the individual channels[2] (although the aggregate transfer rate is a multiple of 64 kbit/s). However, if multiple B-channels are carried over a single VC, then the SDT pointer shall be employed as per Recommendation I.363[3]. To ensure compatibility with Recommendation I.580, the SDT pointer must also be sent in a single VC carring a single H0, H11 or H12 ISDN channel[4].

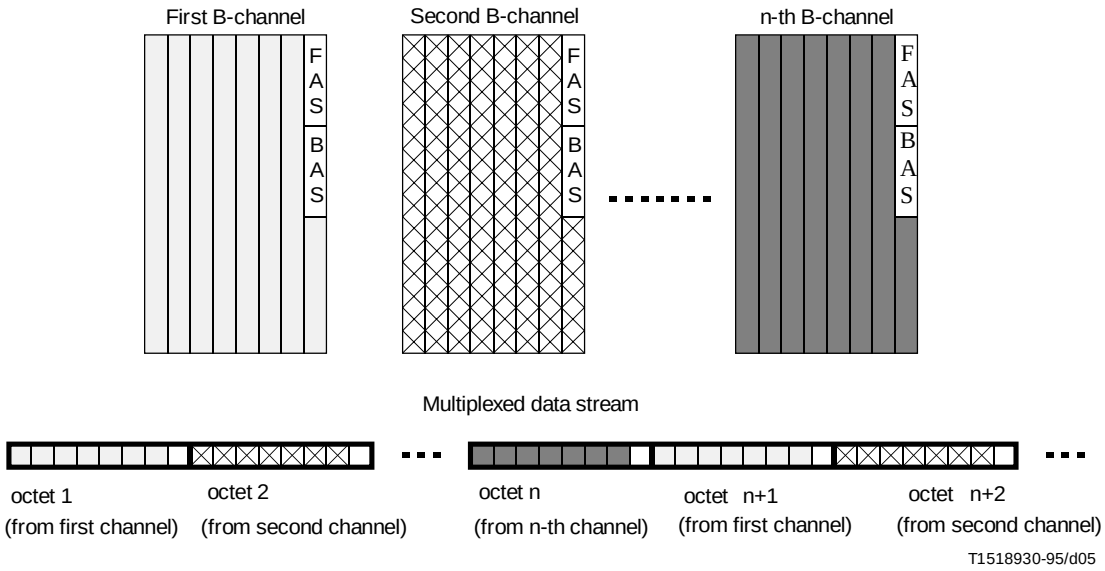

FIGURE 5/H.321

Octet interleaving of multiplexed channels for the transfer mode shown in Figure 4 b)

5.6.2 SAR sublayer functions

In addition to mapping between the CS-PDU and SAR-PDU, in H.321 terminals the SAR sublayer provides the following functions:

a) *Sequence numbering*

At the transmitting end, the SAR sublayer receives a sequence number from the CS sublayer for each CS-PDU. This number occupies 3 bits of the 4-bit Sequence Number (SN) field of the SAR-PDU byte header. At the receiving end, the sequence number value is passed to the CS.

b) *CS indication*

The SAR sublayer indicates the existence of the CS sublayer. In H.321 terminals, and as explained above, when the convergence sublayer SDT pointer is present, coding of the CS Indication (CSI) bit and the SDT pointer byte shall be done according to Recommendation I.363. The Synchronous Residual Time Stamp (SRTS) function is **not** used in H.321 terminals.

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2) This includes the commonly used 2 × 64 kbit/s (2B) connection mode over two virtual channels.

3) It is important to distinguish between the SDT mode and the SDT pointer, According to Recommendation I.363, the SDT pointer is always used in the SDT transfer mode except for the single B-channel case.

4) This is true for all three cases in Figure 4a), b) and c).

c) *Error protection*

The SAR sublayer protects the SN field (i.e. the 3-bit sequence number value and the CSI bit) using a 4-bit SN Protection (SNP) field. The SNP is divided into a 3-bit CRC code to protect the SN field, and an even parity to protect the resulting 7-bit code (4-bit SN plus 3-bit CRC).

5.7 Call control

Since an H.321 terminal is, in principle, a B-ISDN terminal emulating a N-ISDN service, then a call is established through the procedures defined in clause 6/Q.2931[5)].

The out-of-band signalling functional unit of an H.321 terminal shall use, during the call-connection procedure, the Q.2931 Information Elements (IEs) shown in Table 2. These lEs are part of the SETUP message[6)] (Table 3-19/Q.2931) used when initiating a 64 kbit/s based circuit-mode ISDN service call over a broadband ISDN network.

6 Terminal equipment

6.1 Environments

6.2 Audio source and arrangement

(See Recommendation H.320.)

6.3 Video source and arrangement

(See Recommendation H.320.)

6.4 Data and other auxiliary equipment

(See Recommendation H.320.)

6.5 Optional enhancements

(Under study.)

6.6 Error resilience

In B-ISDN environments, a communication channel may suffer from occasional bit errors and cell losses. Audio and video source coding/decoding have inherent or built-in error correction or resilience mechanisms such as the BCH FEC code in Recommendation H.261 which provides an appropriate protection against random bit error events. Furthermore, because the mean time between cell loss events is expected to be acceptably long for the applications supported by H.321 terminals, the short or long FEC interleaver options of the AAL type 1 convergence sublayer are not provided.

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5) That clause of Recommendation Q.2931 outlines the requirements for supporting:

a) 64 kbit/s based circuit-mode ISDN services in B-ISDN; and

b) access signalling interworking between N-ISDN and B-ISDN.

6) Other Q.2931 messages may also use these IEs.

TABLE 2/H.231

Q.2931 Information elements for H.321 terminals

Q.2931 Information element	Information element field(s)	IE parameter(s) for H.321 terminals
Narrow-band Bearer Capability (N-BC)	Information transfer capability	• Unrestricted Digital Information (UDI) • Restricted Digital Information (RDI) • 3,1 kHz audio • UDI with tone/announcement (UDI-TA)
	Transfer mode	• Circuit
	Information transfer rate	• 64 kbit/s • 2 × 64 kbit/s • 384 kbit/s • 1536 kbit/s • 1920 kbit/s • Multirate (64 kbit/s base rate)
	Rate multiplier	• 2 to the maximum number of B-channels
	User information layer 1 protocol	• Recommendation G.711 μ-law • Recommendation G.711 A-law • Recommendations H.221 and H.242
Broadband Bearer Capability (B-BC)	Bearer class	• BCOB-A
	Susceptibility to clipping	• Susceptible to clipping
	Call configuration	• Point to point
Broadband Low Layer Information (B-LLI)	(The support of this information element by H.321 terminals is under study)	
ATM traffic descriptor	Forward peak cell rate (for CLP 0)	(Variable: depends on the transfer rate)
	Backward peak cell rate (for CLP 0)	
	Forward peak cell rate (for CLP 0 + 1)	
	Backward peak cell rate (for CLP 0 + 1)	

TABLE 2/H.321 *(continued)*

Q.2931 Information elements for H.321 terminals

Q.2931 Information element	Information element field(s)	IE parameter(s) for H.321 terminals
AAL parameters	AAL Type	• AAL 1
	Subtype identifier	• Circuit Transport
	CBR rate	• 64 kbit/s • n × 64 kbit/s
	Multiplier	• 2 to the maximum value of n (in n × 64 kbit/s) supported by the corresponding H.321 terminal (Note 1)
	Source clock frequency recovery method	• Null (synchronous) • Adaptive Clock Method (Note 2)
	Error correction method	• Null (no error correction is provided) (Note 3)
	Structure data transfer block size	(Note 4)
	Partially filled cells method	• 47
End-to-end transit delay	Cumulative transit delay value	(Under study)
	Maximum end-to-end transit delay value	
Quality of Service (QOS)	(Under study)	
Narrow-band Layer Compatibility (N-LLC) (Note 5)	Information transfer capability	• Unrestricted Digital Information (UDI) • Restricted Digital Information (RDI) • 3.1 kHz audio • UDI with tone/announcement (UDI-TA)
	Negotiation indicator	• out-band negotiation not possible • out-band negotiation possible
	Transfer mode	• Circuit
	Information transfer rate	• 64 kbit/s • 2 × 64 kbit/s • 384 kbit/s • 1536 kbit/s • 1920 kbit/s • Multirate (64 kbit/s base rate)
	Rate multiplier	• 2 to the maximum number of B-channels
	User information layer 1 protocol	• Recommendation G.711 μ-law • Recommendation G.711 A-law • Recommendations H.221 and H.242

TABLE 2/H.321 *(fin)*

Q.2931 Information elements for H.321 terminals

Q.2931 Information element	Information element field(s)	IE parameter(s) for H.321 terminals
Narrow-band High Layer Compatibility (N-HLC)	(Note 6)	
OAM traffic descriptor	(Under Study)	

NOTES

1 It is important to note that, when H.321 terminals are communicating with H.320 terminals then the multipliers 6, 24 and 30 shall be used for the H_0, H_{11}, and H_{12} transfer rates, respectively. On the other hand, when H.321 terminals are communicating among themselves over a B-ISDN network, then all integer values between 2 and 30 can be used. The capability of transferring n × 64 kbit/s data (for an arbitrary n between 1-24 or 30) over a single VC is under study as explained in 4.4.

2 There are two possible solutions for recovering the source clock in H.321 terminals:

1) If a common clock is available at both ends, then this clock is used to recover timing and synchronize both ends as usually done in a synchronous circuit transport;

2) When a common clock is not available, then the Adaptive Clock Recovery method is used.

Therefore, in H.321 terminals, the Synchronous Residual Time Stamp (SRTS) approach is not needed, and consequently is not supported by this Recommendation.

3 H.321 terminals do not employ the short or long interleaver (FEC and cell-loss recovery mechanism) options available within the convergence sublayer of AAL type 1.

4 As noted in 5.6 of this Recommendation, the SDT mode must be supported by all H.321 terminals, and shall be used at all times. See 5.6 for more details.

5 The (optional) N-LLC information element is used for compatibility checking between the two communicating ends. The attributes in here shall not be in conflict with the attributes specified in the N-BC information element.

6 The (optional) N-HLC information element is used for compatibility checking between the two communicating ends.

7 Intercommunications

7.1 Intercommunication among H.321 terminals

A common mode of (Recommendation H.320) operation among H.321 terminals shall be determined as described in Recommendation H.320. Moreover, when an H.321 terminal is communicating with another H.321 terminal, several possibilities exist regarding the number of virtual channels needed between the two terminals. Both single and multiple VC scenarios are shown in Figure 6.

7.2 Intercommunication with N-ISDN terminals

H.321 terminals have the capability of interworking with H.320 terminals through the network support of interconnection between B-ISDN and N-ISDN as specified in Recommendation I.580.

A common mode of (Recommendation H.320) operation among H.320 and H.321 terminals shall be determined as described in Recommendation H.320. Moreover, several modes of communications are possible between H.320 and H.321 terminals, depending on, for example, the number of channels used. Examples of these communication modes are shown in Figure 7.

7.3 Intercommunication with telephony

H.321 terminals shall be able to interwork with telephones accommodated in N-ISDN and PSTN using G.711 audio.

7.4 Intercommunication with audiovisual terminals connected to other networks

A common mode of (Recommendation H.320) operation among H.322/H.323 and H.321 terminals shall be determined as described in Recommendation H.320. H.321 terminals will interwork with both H.322 (Recommendation H.320 over guaranteed bandwidth LAN) and H.323 (H.320 over non-guaranteed bandwidth LAN) terminals as shown in Figure 8.

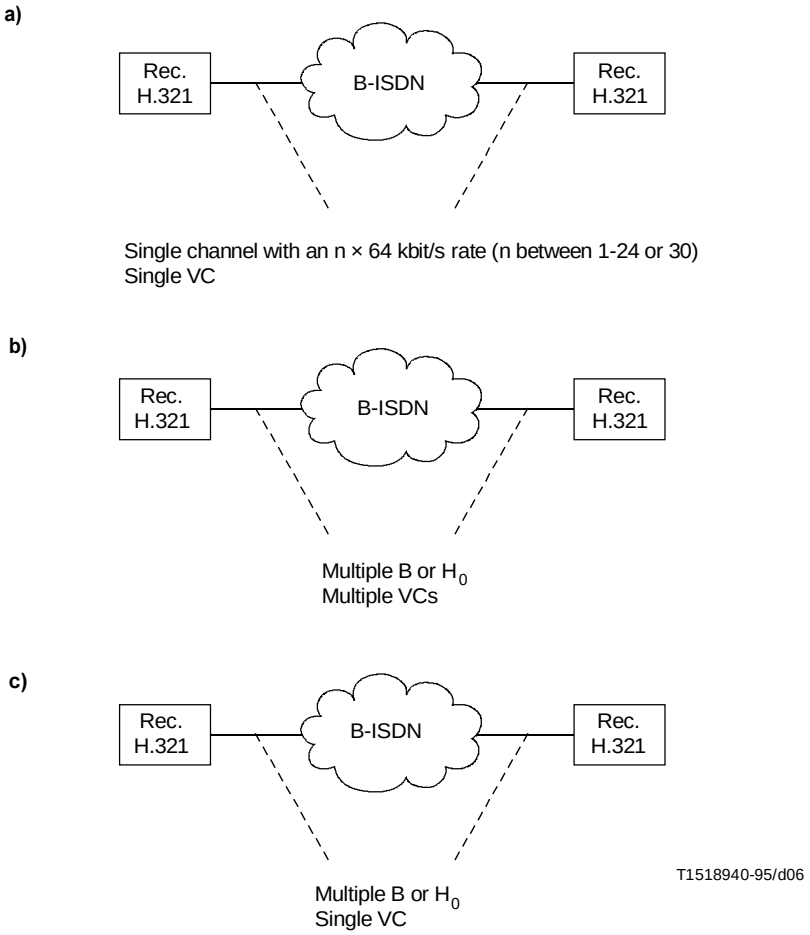
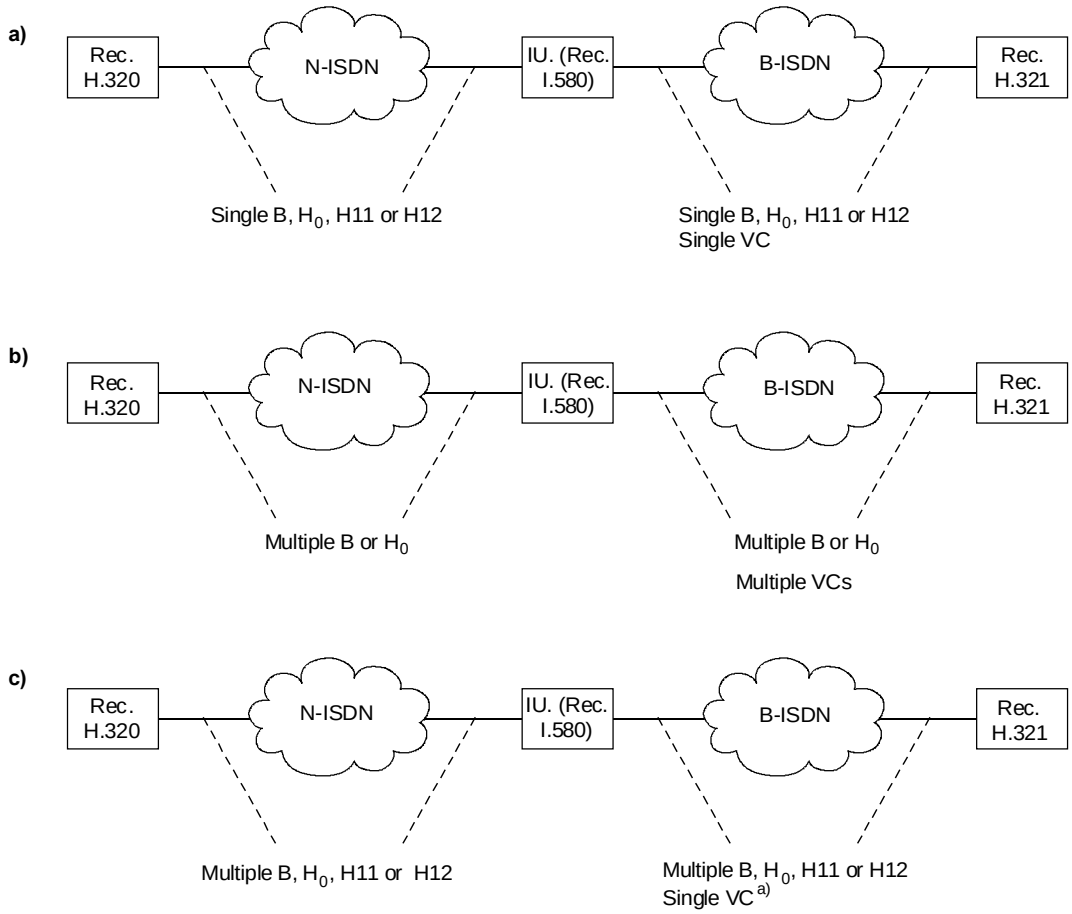


FIGURE 6/H.321

Interworking scenarios between H.321 terminals



a) This option is under study.

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FIGURE 7/H.321

Interworking scenarios among H.320 and H.321 terminals

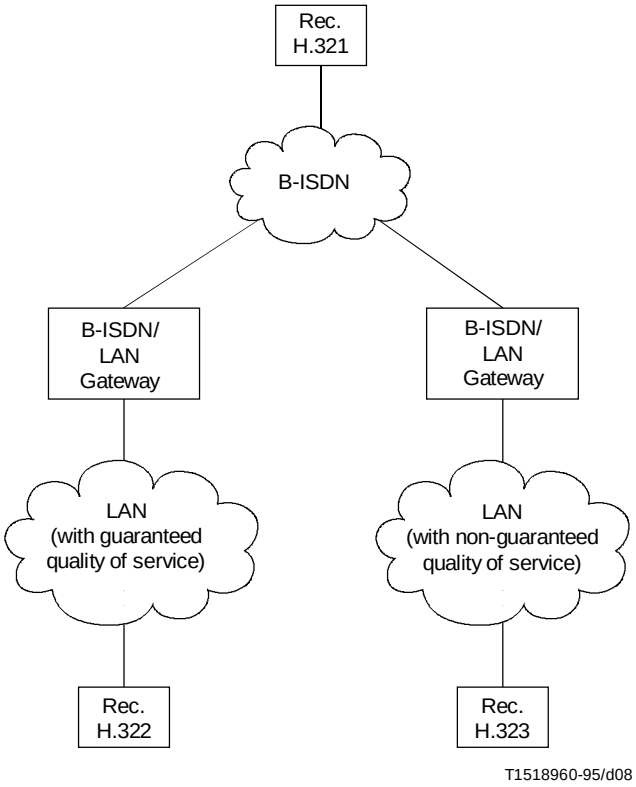

FIGURE 8/H.321

Interworking between H.322/H323 and H321 terminals